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REAL TIME DRAINAGE MONITORING SYSTEM

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ABSTRACT

Effective management of subterranean drainage systems is essential in urban settings to avoid environmental risks and guarantee public health and safety. The complete Underground Drainage Monitoring System (UDMS) that is suggested in this study is intended to monitor water levels in drainage networks and identify hazardous gasses. To identify pollutants including methane, carbon dioxide, and other volatile organic compounds (VOCs) released by sewage, the system combines MQ135 and MQ4 gas sensors. In order to help avoid overflow and floods, a water level sensor is also used to monitor water levels. In addition, a GSM module makes it possible to transmit data in real time to authorities or a central monitoring station, which makes it easier to act quickly in the event of an emergency or other unusual circumstance. By providing a scalable and reasonably priced solution to improve underground drainage system management and upkeep, the suggested UDMS promotes both public welfare and environmental sustainability

Keywords: Underground Drainage Monitoring System, UDMS, GSM, Gas Sensors, Toxic Gas, Overflow, Smart City Etc.

I. INTRODUCTION

Underground drainage systems in urban areas are becoming more difficult to manage effectively, calling for creative solutions that blend technology and usability. This study presents the implementation of an Arduino-based Underground Drainage Monitoring System (UDMS), a flexible and affordable microcontroller platform. Through the integration of Arduino's adaptability with sensor technologies, this system provides a dependable and user-friendly method for tracking and optimizing subsurface drainage network performance.

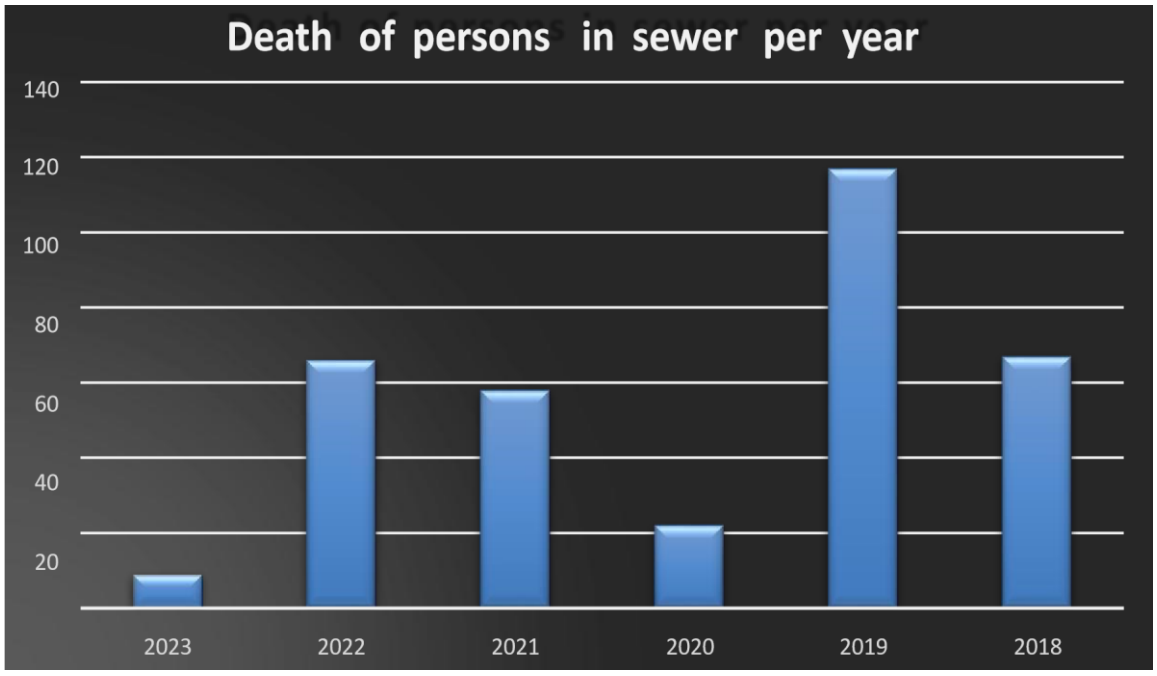

Fig 1: Statistics of Death person sewer per year.

II. METHODOLOGY

The MQ4 gas sensor, a water level sensor, and an Arduino Uno with GSM900A are the two sensors used in this real-time drainage monitoring system, which is intended to provide thorough drainage infrastructure

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management and monitoring. The Arduino Uno is really the brains of the system; it manages connectivity and sensor data gathering. The MQ4 gas sensor is essential for the detection of dangerous gases like methane, which may signal possible problems with the drainage system and enable preventative maintenance and hazard mitigation. As this is going on, the water level sensor keeps track of the water's level and acts as a warning system for impending floods.

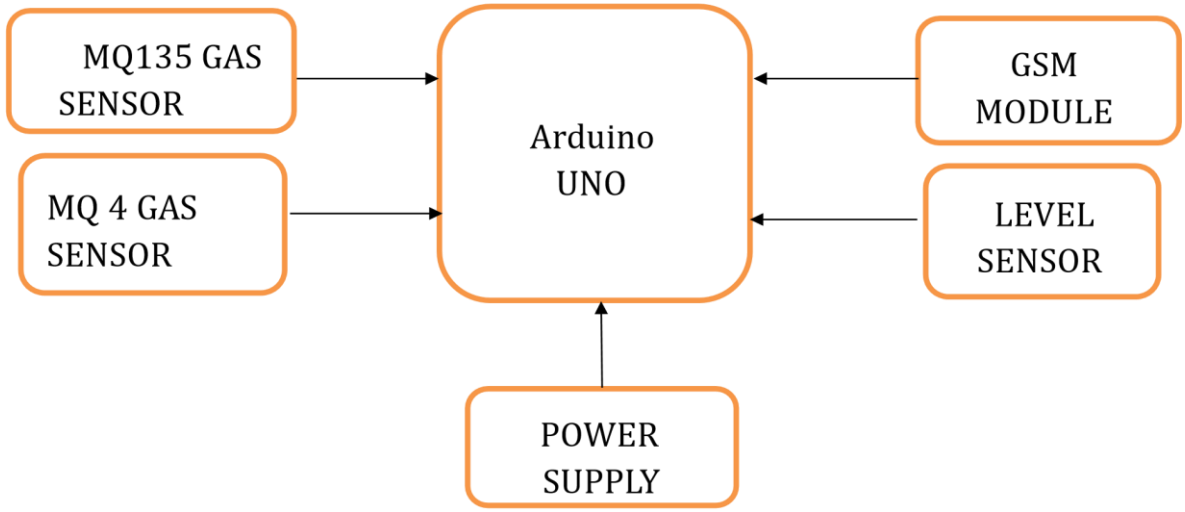

Fig 2: Block Diagram of Underground drainage system

Real-time data transmission over the GSM network is made possible with the GSM900A module, which guarantees stakeholders receive updates and alerts instantly. Power is consistently supplied via a mains adapter or battery pack, guaranteeing uninterrupted operation even in remote areas. The sensor data is gathered, analyzed, and sent to a distant computer for comprehensive monitoring and analysis. This gives decision-makers practical information to reduce the danger of flooding and improve drainage systems. All things considered, this technology provides a small, scalable, and effective way to monitor drainage systems, increase flood resilience, and protect infrastructure and communities.

Hardware Design

In order to create a coherent system, the hardware design for a real-time drainage monitoring system uses an Arduino Uno with GSM900A in conjunction with two essential sensors: a MQ4 gas sensor and a water level sensor. The Arduino Uno microcontroller, which functions as the system's central processing unit, is at its core. The water level sensor, which measures water levels for flood monitoring, and the MQ4 gas sensor, which detects methane and other gases suggestive of drainage problems or leaks, are connected to it. Furthermore, the GSM900A module allows for GSM network communication, allowing real-time data delivery to a selected recipient or a distant server. Continuous operation is ensured by a steady power source, which might come from a mains adapter or battery pack. Carefully designed electronics and wiring connections ensure stability and compatibility. To guarantee accuracy and dependability, the system is put through extensive testing and calibration after it is assembled. Following a successful integration process, the system is installed at key monitoring sites, like sewer manholes or drainage outlets, where it is ready to deliver crucial information and timely alarms for efficient flood risk management. By using this hardware design method, it’s possible to create a reliable real-time drainage monitoring system that can track water levels, identify drainage problems, and promptly notify users in order to control and reduce the risk of flooding.

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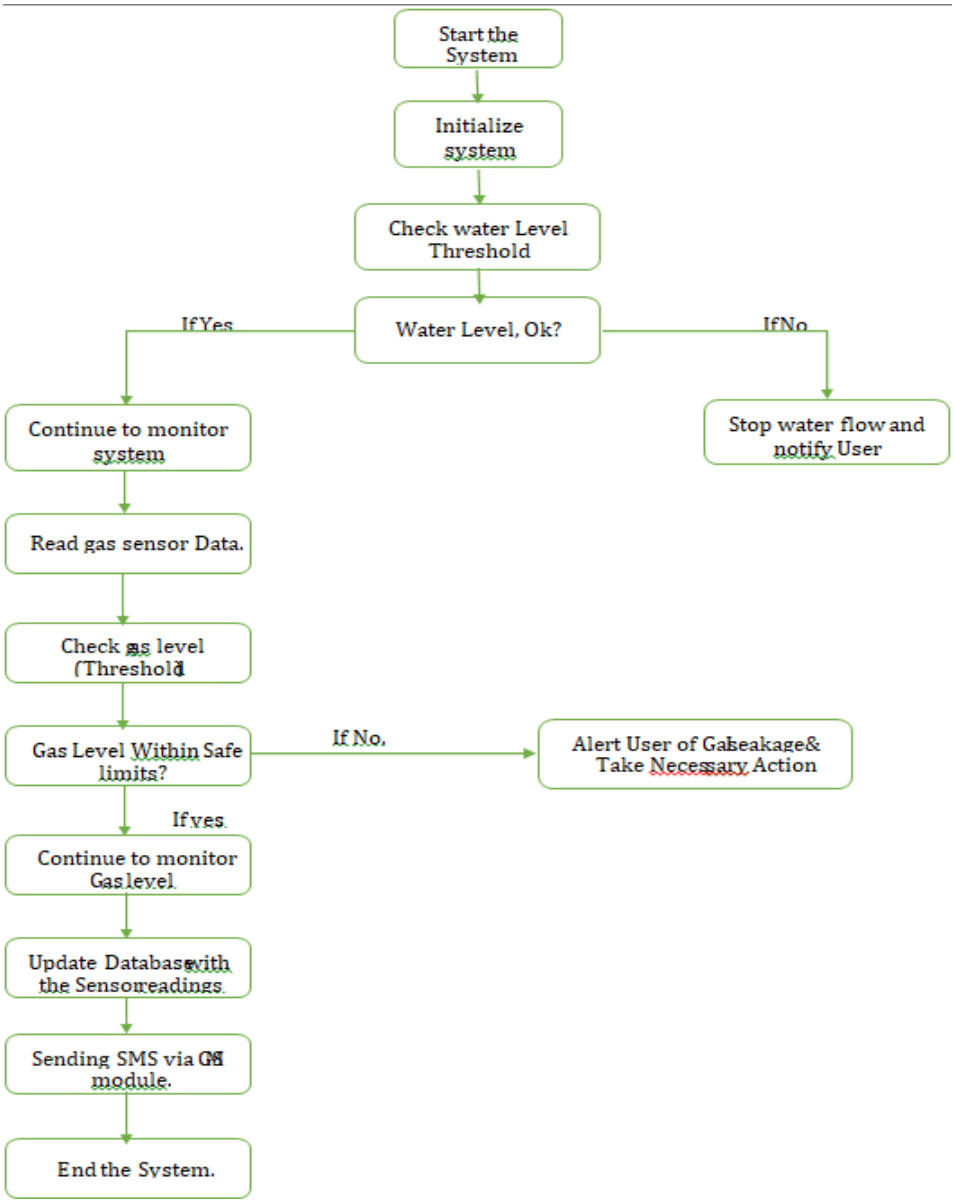
Flow Chart



III. MODELING

The real-time drainage monitoring system model that uses an Arduino Uno with GSM900A and two key sensors—a water level sensor and a MQ4 gas sensor—is small and sturdy, with a design that is suited for widespread use in drainage infrastructure. The Arduino Uno microcontroller, which acts as the system's central processing unit, forms the foundation of the system.

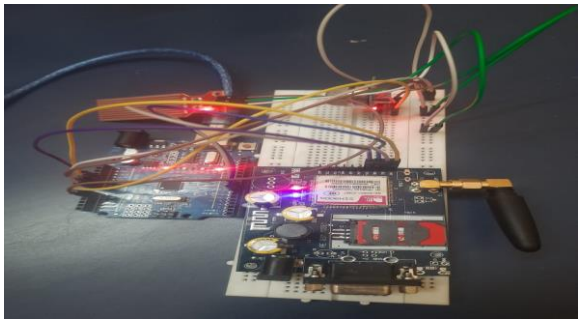


Fig 3: Actual view of model

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IV. RESULTS AND MSG WINDOW

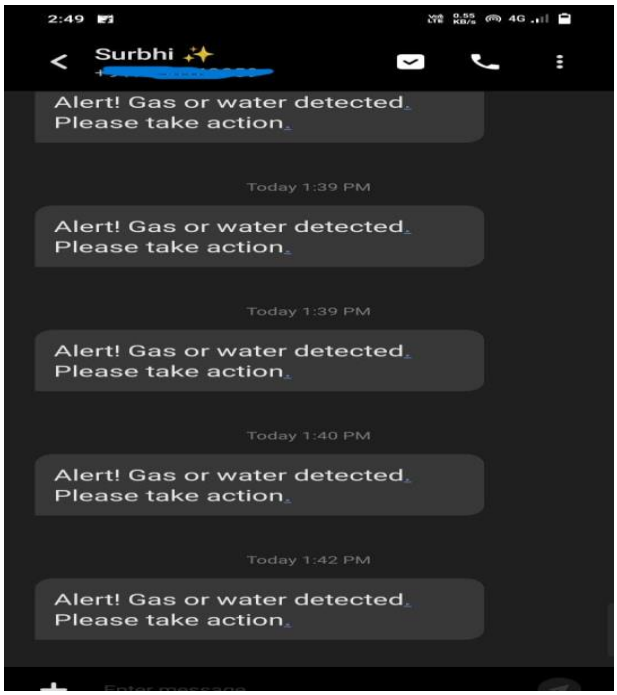

Fig 4: Msg Window

V. CONCLUSION

In conclusion, utilizing Arduino to build an underground drainage monitoring system provides an economical and effective way to gather data in real time. The system can offer significant insights for drainage management through the integration of sensors that detect many factors, including water levels and gas sensors. Because of its adaptability and simplicity in programming, Arduino may be used by users with different levels of technical knowledge. This initiative could improve drainage management, support sustainable water management techniques, and improve urban infrastructure.

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